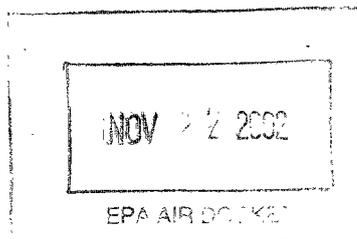


Air



Used Oil Analysis and Waste Oil Furnace Emissions Study

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State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
Natural Resources Conservation Council



Table C
Waste Oil Burner Specifications

Facility	Make	Model	Burner	Size Input (BTU/hr)	gph	oil psi
No. 2 oil	Oneida Royal	0-224B-5	Beckett-AF AK-076880	280,000	2	7
WO/1	Shenandoah	200	Shenandoah GB3.50	235,200	1.68	9
WO/2	Clean Burn	CB86AH	Clean Burn CB85HS	185,000	1.33	1
WO/3	Clean Burn	CB86BH	Clean Burn CB85HS	280,000	2.0	3.5
WO/4	Clean Burn	CB86BH	Clean Burn CB85HS	280,000	2.0	3
WO/5	Clean Burn	CB90AH	--	185,000	1.3	-

Table D
Used Oil Sample Analytical Results for Stack Test Sources

Facility	arsenic ¹	barium	cadmium	chromium	lead	nickel	zinc	TX	TOX	Chloride	Bromide	Flash point ¹ (°F)
	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	
No 2 oil	-	<1.00	<1.00	1.02	<20.0	<1.00	<5.0	<250	<250	33.2	64.2	102
W(O)/1	-	3.43	1.20	3.85	31.8	1.63	1,100	<250	<250	<26.0	<26.0	-
W(O)/2	-	<1.00	<1.00	3.67	40.5	1.53	1,020	<250	<250	101.0	68.9	189
W(O)/3	-	1.75	1.75	4.23	29.9	2.03	1,280	<250	<250	75.2	60.6	100
W(O)/4	-	63.40	<1.00	2.10	11.9	<1.00	709	<250	<250	62.0	62.2	133
W(O)/5	-	2.14	2.14	4.73	96.8	3.69	868	500	460	106.0	61.0	102
high ¹	-	63.40	2.14	4.73	96.8	3.69	1,280	500	460	106.0	68.9	>200
average ²	-	-	-	-	-	-	-	<300	<292	<74.0	<35.7	-
low ²	-	1.00	<1.00	2.10	11.9	<1.00	709	<250	<250	<26.0	<26.0	68

¹ Arsenic concentrations are not reported due to analytical difficulties with accurately determining arsenic concentrations at the necessary levels. While the laboratory can quantify arsenic concentrations in oil greater than 250 ppb, under the procedures of method 3050 some organic arsenic compounds are lost through volatilization, resulting in poor spike recoveries and the possibility of false negative results.

² Values are for waste oil testing results only
³ The waste oil samples were analyzed by two separate laboratories for flash point

Table E
Emission Testing Actual Results For Each Test Run (mg/min)

Facility	HCl	Particulate	Arsenic ¹	Cadmium ¹	Chromium	Lead
	(mg/min)	(mg/min)	(mg/min)	(mg/min)	(mg/min)	(mg/min)
No. 2 oil	2.6	0	<0.01	<0.02	0.02	0.03
	1.9	0	<0.02	<0.03	0.02	0.03
WO/1	52.8	500	<0.05	<0.07	0.15	1.58
	58.6	333	<0.02	<0.07	0.11	1.52
WO/2	18.7	333	<0.02	<0.04	0.13	1.47
	14.6	333	<0.02	<0.03	0.10	1.17
WO/3	68.9	667	<0.03	<0.19	0.33	3.83
	21.7	333	<0.02	<0.06	0.09	1.32
WO/4	20.5	667	<0.05	<0.09	0.28	2.92
	17.9	667	<0.02	<0.07	0.19	2.53
WO/5	40.3	500	<0.02	<0.07	0.15	2.60
	32.2	333	<0.02	<0.06	0.12	1.90
average ²	34.6	467	<0.03	<0.08	0.17	2.09

¹ Arsenic and cadmium results are all reported as non detectable. The values presented represent the varying levels of detection for each specific sample collected which is a function of the sample mass.

² Values are for waste oil testing results only.

Table F
Waste Oil Furnace Operating Parameters

Facility	Temp	Moisture	Flow Rate	Velocity	Oxygen	Stk diam.	unit size
	(°F °C)	(% by vol)	(acfm acmm)	(ft/min m/min)	(% by vol)	(in m)	(MBTU/hr)
No. 2 oil	446/230	9.0	160/5	457/139	8.2	8/0.203	280
	479/248	9.1	154/4	440/134	8.2	"	
WO/1	516/269	2.2	267/8	766/233	9.0	"	235
	475/246	2.0	285/8	816/249	2.6	"	
WO/2	274/134	1.9	258/7	740/226	11.2	"	185
	426/219	3.1	212/6	608/185	11.3	"	
WO/3	470/243	7.6	177/5	507/155	11.4	"	280
	618/326	8.8	111/3	317/97	11.0	"	
WO/4	358/181	4.6	288/8	826/252	15.2	"	280
	385/196	0.1	253/7	725/221	15.2	"	
WO 5	287/142	4.4	205/6	587/179	11.4	"	185
	305/152	5.1	151/4	434/132	10.8	"	
average ¹	411/210	4.0	221/6.2	633/193	10.9	8/0.203	

¹ Values are for waste oil testing results only

Table G
Waste Oil Furnace Operating Parameters

Facility	Temp	Moisture	Flow Rate	Velocity	Oxygen	Stk diam.	unit size
	(°F °C)	(% by vol)	(acfm acmm)	(ft/min m/min)	(% by vol)	(in m)	(Mbtu/hr)
No. 2 oil	446/230	9.0	160/5	457/139	8.2	8/0.203	280
	479/248	9.1	154/4	440/134	8.2	"	
WO/1	516/269	2.2	267/8	766/233	9.0	"	235
	475/246	2.0	285/8	816/249	2.6	"	
WO/2	274/134	1.9	258/7	740/226	11.2	"	185
	426/219	3.1	212/6	608/185	11.3	"	
WO/3	470/243	7.6	177/5	507/155	11.4	"	280
	618/326	8.8	111/3	317/97	11.0	"	
WO/4	358/181	4.6	288/8	826/252	15.2	"	280
	385/196	0.1	253/7	725/221	15.2	"	
WO/5	287/142	4.4	205/6	587/179	11.4	"	185
	305/152	5.1	151/4	434/132	10.8	"	
average ¹	411/210	4.0	221/6.2	633/193	10.9	8/0.203	

¹ Values are for waste oil testing results only.